May 1, 1928. 1,668,218

D. V. SHERBAN

PNEUMATIC FUEL GRADER

Filed June 15, 1923

FIG. 2.

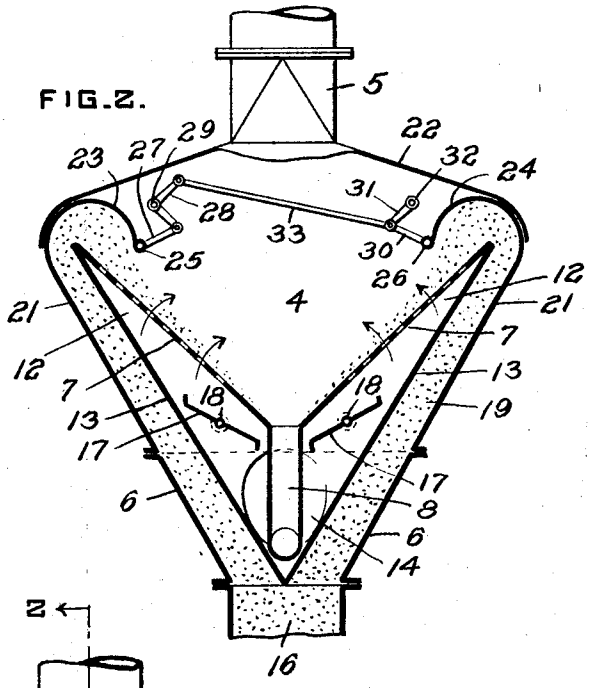


FIG. 1.

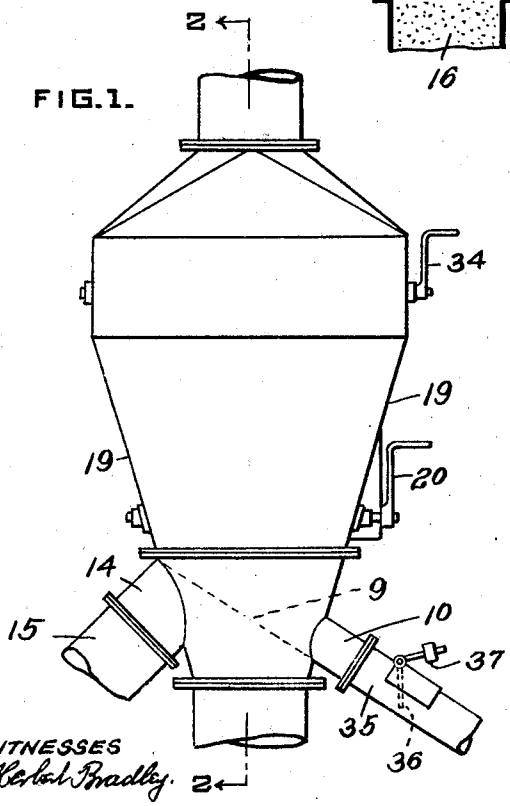
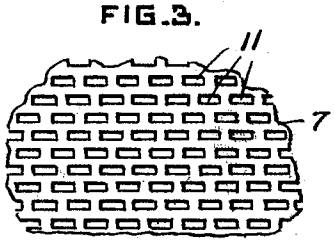


FIG. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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PNEUMATIC FUEL GRADER.

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This invention relates to the art of grading and separating finely divided material from that which is less finely divided, and an object of this invention is to provide a method of and device for grading finely divided material such as fuel (coal and the like) and for separating the same from less finely divided material.

A further object of this invention is to produce a pulverized fuel grading device which may be readily and easily adjusted during operation to vary the fineness of the fuel delivered.

A still further object is to produce a finely divided fuel grading device which is cheap to manufacture, of easy installation and efficient in operation.

In the drawings Figure 1 is a view in side elevation of one form of device for carrying out this invention. Fig. 2 is a vertical section of the same taken on line 2—2 of Fig. 1 and Fig. 3 is an enlarged view of a portion of the device.

The device is constructed so as to be inserted in the line leading from the fuel pulverizer to the fuel storage bins or to the point of consumption and is provided with a separating chamber 4 having an offtake 5 in its top and into which two oppositely disposed conduits 6—6 discharge the pulverized coal or other material to be graded.

Chamber 4 on each side of its center and below the entrance point for the fuel for that side is provided with an inclined floor 7 which extends from said fuel entrance point to the top of one side of centrally located hopper 8. The bottom 9 of hopper 8 as shown by dotted lines Fig. 1 is inclined and leads to an outlet pipe 10 for the coarse rejected fuel. Floors 7—7—, there being one on each side of the chamber of the device, serve to conduct the coarse fuel deposited thereon to hopper 8. Floors 7—7 are provided with perforations 11 as shown in Figs. 2 and 3 and the space 12 below each floor 7 and between it and the wall 13 of the adjacent conduit 6 forms an air-distributing chamber. An air inlet 14 connected to an air pipe 15 for leading air from any suitable source of supply communicates with both chambers 12. Air distributing chambers 12 extend beneath the entire area of floors 7—7 which separate chambers 12—12 from chamber 4.

Conduits 6—6 communicate with a conduit or pipe 16 which is adapted to convey the ungraded fuel to the device. Dampers or valves 17—17 located within air distributing chambers 12—12 are utilized for controlling the flow of air through the perforations 11 in the inclined floors 7—7. Each damper or valve is mounted on a shaft 18 and extends from end to end of its chamber. The shafts extend through opposite ends 19—19 of the housing of the device and each shaft at one end is provided with a crank handle 20 by means of which the damper may be turned to the desired position for controlling the flow of clean air from line 15 through perforations 11 in the inclined supporting floors.

The entire housing including the ends 19—19, the sides 21 and top 22 is preferably formed from sheet metal. The top of each side 21 (one marked 23 and the other marked 24) extends into chamber 4 on a radius as shown and since the sheet metal may be readily bent these ends form adjustable deflectors for directing the fuel laden air streams issuing from conduits 6—6 into chamber 4.

The deflectors are adapted to be adjusted to different positions in order to vary the general direction of flow of the fuel laden streams of air which enter chamber 4 from opposite sides. Stiffening rod 25 of deflector 23 by means of a link 27 connects with a bell crank lever 28 secured to a rod 29 extending through ends 19—19 of the housing. Stiffening rod 26 of deflector 24 by means of a link 30 connects with a link 31 loosely carried on a rod 32 mounted in ends 19—19 of the housing. A long link 33 connects link 30 to the upper arm of bell crank lever 28. Rod 29 at one end outside of the housing carries a crank handle 34 and by means of this the position of the deflectors 23 and 24 may be simultaneously adjusted.

Outlet pipe 10, by means of a suitable pipe line 35, leads the rejected oversized material collected in hopper 8 back to the crusher or to a suitable storage bin. Pipe line 35 is provided with a check valve 36 loaded by means of an adjustable weight 37 and by this means the escape of fuel laden air through pipe line 35 is prevented.

In the operation of the device ungraded pulverized material is delivered through pipe line or conduit 16 and the air stream carrying the material may be either forced

or induced. The material of course may be conducted either from crushers or pulverizers or from any suitable source. The fuel laden air upon entering chamber 4 is subjected to a sudden decrease in velocity and change of direction which causes the light particles of fuel to float in the chamber and to be carried through outlet 5 to the point of storage or consumption. The coarse material due to gravity falls onto one or the other of the reticulated inclined members 7. These reticulated members 7 serve as diffusers for the air entering chamber 4 from chambers 12—12 in which the air is maintained at a higher pressure than that in chamber 4. The coarse material in its travel down the inclined reticulated members to hopper 8 encounters the air streams issuing through the perforations 11 in said member and since these streams issue at an angle to the travel of the material down members 7 a scrubbing action takes place, and the lighter particles of material will be carried by the air issuing through the perforations 11 through chamber 4 to its outlet.

The size of material delivered through outlet 5 will depend upon the air velocities through perforations 11 and the position of deflectors 23 and 24 and these air velocities can be controlled by dampers 17 and the position of the deflectors by manipulating crank handle 34.

The two streams of fuel laden air issuing through the perforations 11 in the opposed members 7 meet at the center of chamber 4. The direction of flow of the streams is therefore changed at this point allowing the heavier particles of coal to fall by gravity.

Having thus described my invention, what I claim is:—

1. A fuel grader including in combination, an inlet for fuel laden air, a reticulated surface, means for causing the heavier particles of fuel in said air to be deposited on said surface, means for directing clean air through said surface so as to separate any smaller particles from the heavier particles deposited thereon and an outlet for graded material.

2. A fuel grader including in combination, an inlet for fuel laden air, a reticulated surface, means for changing the direction of flow of said fuel laden air so that the heavier particles of fuel in said air are deposited on said surface, means for directing clean air through said surface so as to separate any smaller particles from the heavier particles deposited thereon and an outlet for air carrying graded material.

3. A fuel grader including in combination, an inlet for fuel laden air, an inclined reticulated surface, means for changing the direction of flow of said fuel laden air above said surface so that the heavier particles of fuel fall on said surface, means for directing clean air through said surface so as to separate any smaller particles from the heavier particles deposited thereon, an outlet for air carrying graded material and an outlet for over-size material.

4. A fuel grader including in combination, an inlet for fuel laden air, inclined reticulated diffuser plates, adjustable deflectors for changing the direction of flow of said fuel laden air so that heavier particles of fuel of predetermined size are deposited on and roll down said inclined plates, means for directing clean air through said plates so as to separate any smaller particles from the heavier particles moving therealong, an outlet for air carrying graded material and an outlet for over-size material below said diffuser plates.

5. The method of grading fuel which consists in changing the direction of flow of a stream of fuel laden air so as to cause the heavier particles of fuel to fall from said stream, and in scrubbing the fallen particles by a diffused stream of air flowing across the path of said particles.

6. The method of grading fuel which consists in reducing the velocity and changing the direction of flow of a stream of fuel laden air so as to cause the heavier particles of fuel to fall from said stream, directing the fallen particles along an inclined path and in scrubbing the fallen particles and separating therefrom any smaller particles by a stream of air flowing across the path of said particles.

In testimony whereof, I have hereunto subscribed my name this 13th day of June, 1923.

DANIEL V. SHERBAN.